IN THE CLAIMS

Claims 1 to 18, are pending in this application. Please cancel existing claims 1 to 18 and replace with new claims 19 to 106.

1-18   (Cancelled)

19.   (New) A self-organizing network comprising:

    (a)   a plurality of nodes;

    (b)   at least one link interconnecting neighbouring ones of said nodes;

    (c)   each of said nodes being operable to maintain information about each of said other nodes that is within a first portion of said nodes, said information including:

        (i)   a first identity of another one of said nodes within said first portion;

        (ii)   for each first identity, a second identity representing a neighbouring node that is a desired step to reach the said another one of said nodes respective to said first identity;

    (d)   each of said nodes being operable to maintain a third identity representing a neighbouring node that is a desired step to send a request for information about said nodes in a second portion of said nodes that is not included in said first portion.

20.   (New) The network according to claim 19 wherein said third identity is determined based on which of said neighbouring nodes most frequently appears in each said second identity.

21.   (New) The network of claim 19 wherein each of said nodes is operable to exchange said information with its neighbouring nodes.

22. (New) The network of claim 19 wherein said at least one link has a set of service characteristics such that any path between two of said nodes has a cumulative set of service characteristics.

23. (New) The network of claim 22 wherein said information includes said cumulative set; and said desired step associated with said second identity is based on which of said paths has a desired cumulative set of service characteristics.

24. (New) The network of claim 22 wherein said service characteristics include at least one of bandwidth, latency and bit error rate.

25. (New) The network of claim 19 wherein said nodes are at least one of computers, telephones, sensors, personal digital assistants.

26. (New) The network of claim 19 wherein said at least one link is based on a wireless connection.

27. (New) The network of claim 19 wherein a network core is formed between neighbouring nodes that determine each other is a desired step to locate said nodes within said second portion.

28. (New) The network of claim 27 wherein each said node is operable to deliver instructions to other nodes between said core and itself to maintain information about itself.

29. (New) The network of claim 27 wherein said information includes, for each said first identity, a value representing a distance-to-data marked stream for said node associated with said first identity.

30. (New) The network of claim 29 wherein nodes associated with said first identity are ranked in an ascending order increasing according to said distance and said instructions are delivered to those nodes according to said rank.

31. (New) The network of claim 19 comprising at least 2,000 nodes interconnected by a plurality of links.

32. (New) The network of claim 19 comprising at least 5,000 nodes interconnected by a plurality of links.

33. (New) The network of claim 19 comprising at least 10,000 nodes interconnected by a plurality of links.

34. (New) The network of claim 19 comprising at least 100,000 nodes interconnected by a plurality of links.

35. (New) A node for use in a self-organizing network having a plurality of other nodes and at least one link interconnecting neighbouring ones of said nodes; said node comprising:

    (a) a computing apparatus operable to maintain information about each of said other nodes that is within a first portion of all of said other nodes, said information including:

        (i) a first identity of another one of said nodes within said first portion;

        (ii) for each said first identity, a second identity representing a neighbouring node that is a desired step to reach the said another one of said nodes respective to said first identity;

said computing apparatus further operable to maintain a third identity representing a neighbouring node that is a desired step to send a request for information about said nodes in a second portion of said nodes that are not included in said first portion.

36. (New) A computer readable medium for storing a set of programming instructions for execution by, or on behalf of, a node forming part of a self-organizing network having a plurality of other nodes and at least one link interconnecting neighbouring ones of said nodes; said programming instructions for causing a computing apparatus within said node to maintain information about each of said other nodes that are within a first portion of all of said other nodes, said information including:

    (a) a first identity of another one of said nodes within said first portion;

(i)   for each said first identity, a second identity representing a neighbouring node that is a desired step to reach the said another one of said nodes respective to said first identity;

said programming instructions for further causing said computing apparatus to maintain a third identity representing a neighbouring node that is a desired step to send a request for information about said nodes in a second portion of said nodes that are not included in said first portion.

37.   (New) The computer readable medium according to claim 36 wherein said third identity is determined based on which of said neighbouring nodes most frequently appears in each said second identity.

38.   (New) The computer readable medium of claim 36 wherein each of said nodes is operable to exchange said information with its neighbouring nodes.

39.   (New) The computer readable medium of claim 36 wherein said at least one link has a set of service characteristics such that any path between two of said nodes has a cumulative set of service characteristics.

40.   (New) The computer readable medium of claim 39 wherein said information includes said cumulative set; and said desired step associated with said second identity is based on which of said paths has a desired cumulative set of service characteristics.

41.   (New) The computer readable medium of claim 39 wherein said service characteristics include bandwidth.

42.   (New) The computer readable medium of claim 39 wherein said service characteristics include latency.

43.   (New) The computer readable medium of claim 39 wherein said service characteristics include bit error rate.

44.   (New) The computer readable medium of claim 36 wherein said nodes are computers.

45. (New) The computer readable medium of claim 36 wherein said nodes are telephones.

46. (New) The computer readable medium of claim 36 wherein said nodes are sensors.

47. (New) The computer readable medium of claim 36 wherein said nodes are personal digital assistants.

48. (New) The computer readable medium of claim 36 wherein said at least one link is based on wireless connections.

49. (New) The computer readable medium of claim 36 wherein a network core is formed between neighbouring nodes that determine each other is a desired step to locate said nodes within said second portion.

50. (New) The computer readable medium of claim 49 wherein each said node is operable to deliver instructions to other nodes between said core and itself to maintain information about itself.

51. (New) The computer readable medium of claim 49 wherein said information includes, for each said first identity, a value representing a distance-to-data marked stream for said node associated with said first identity.

52. (New) The computer readable medium of claim 51 wherein nodes associated with said first identity are ranked in an ascending order increasing according to said distance and said instructions are delivered to those nodes according to said rank.

53. (New) The computer readable medium of claim 36 comprising at least 2,000 nodes interconnected by a plurality of links.

54. (New) The computer readable medium of claim 36 comprising at least 5,000 nodes interconnected by a plurality of links.

55. (New) The computer readable medium of claim 36 comprising at least 10,000 nodes interconnected by a plurality of links.

56. (New) The computer readable medium of claim 36 comprising at least 100,000 nodes interconnected by a plurality of links.

57. (New) A computer readable medium for storing a set of programming instructions for execution by, or on behalf of, a first node on a hierarchical network having a plurality of nodes and at least one link interconnecting each of said nodes, said instructions causing a computing apparatus to select and maintain information about a parent node, said parent node comprising a neighbouring node in said network that is above said first node in respect to the hierarchy of said network or equal to said first node when there is no node that is above said first node.

58. (New) A computer readable medium as claimed in claim 57 wherein said instructions cause said computer apparatus to select among a plurality of parent nodes based on which parent node is the next best step to a predetermined set of other nodes on said network.

59. (New) A computer readable medium as claimed in claim 57 wherein said instructions cause said computer apparatus to select and maintain information about a plurality of parent nodes in said network to facilitate formation of different hierarchies within the same network.

60. (New) A computer readable medium as claimed in claim 57 wherein said instructions cause said computer apparatus to push information from said first node to a subset of neighbouring nodes including at least one of said selected parent nodes.

61. (New) A computer readable medium as claimed in claim 57 wherein said instructions cause said computer apparatus to push information received from a neighbouring node to at least one of said selected parent nodes.

62. (New) A computer readable medium as claimed in claim 57 wherein said instructions cause said computer apparatus to push information to a node that has selected said first node as a parent node.

63. (New) A computer readable medium for storing a set of programming instructions for execution by, or on behalf of, a first node on a self-organizing network having a plurality

of nodes and at least one link interconnecting said nodes, said instructions causing a computing apparatus to select and remove information about one or more missing nodes in said network by delaying the sending of predetermined classes of updates to said network.

64.   (New) A computer readable medium as claimed in claim 63 where a node update is delayed before being sent to a neighbor node if an update about said node has not been previously sent to said neighbor.

65.   (New) A computer readable medium as claimed in claim 63 where a node update is delayed before being sent to a neighbor node if the previous update about said node sent to said neighbor belongs to a predetermined class of updates.

66.   (New) A computer readable medium as claimed in claim 65 where said predetermined class is a node update where said update indicates that no route is possible via said sending node.

67.   (New) A computer readable medium for storing a set of programming instructions for execution by, or on behalf of, a first node on a self-organizing network having a plurality of nodes and at least one link interconnecting each of said nodes, said instructions causing a computing apparatus to select and remove information about one or more missing nodes in said network by sending predetermined classes of updates to said network when a predetermined internal state is reached.

68.   (New) A computer readable medium as claimed in claim 67 where said predetermined internal state is where the hop cost to said node increases more then a predetermined amount.

69.   (New) A computer readable medium as claimed in claim 67 where said predetermined internal state is where the importance value associated with said node increases more then a predetermined amount.

70.   (New) A computer readable medium as claimed in claim 67 where said predetermined class indicates that no route is possible to said node via said sending node.

71. (New) A computer readable medium for storing a set of programming instructions for execution by, or on behalf of, a first node on a self-organizing network having a plurality of nodes and at least one link interconnecting each of said nodes, said instructions causing a computing apparatus to identify the route between a source node and a destination node.

72. (New) A computer readable medium as claimed in claim 71 wherein said instructions further cause the computing apparatus to identify the proximity of said first node to the identified route between said source node and said destination node.

73. (New) A computer readable medium as claimed in claim 71 wherein said node on the identified route between a source node and destination node will set the importance value of said destination node to a predefined value.

74. (New) A computer readable medium as claimed in claim 73 where the predefined value is the highest importance value possible.

75. (New) A computer readable medium as claimed in claim 71 wherein said instructions further cause the computing apparatus to send route updates about said destination node on a relatively more frequent basis the closer that said first node is to the route between said source node and said destination node.

76. (New) A computer readable medium for storing a set of programming instructions for execution by, or on behalf of, a first node on a self-organizing network having a plurality of nodes and at least one link interconnecting each of said nodes, said instructions causing a computing apparatus to assign an importance value to updates that are to be sent over said network.

77. (New) A computer readable medium as claimed in claim 76 wherein said importance value is determined by how close said first node is to a specified data path or specified structure in the network.

78. (New) A computer readable medium as claimed in claim 76 wherein said instructions further cause the computing apparatus to assign a hop cost value to updates that are to be sent over said network.

79. (New) A computer readable medium as claimed in claim 78 wherein said hop cost value for a particular destination node is determined by an accumulation of service characteristics on the route from said node to said destination node.

80. (New) A computer readable medium as claimed in claim 76 wherein said instructions further cause the computing apparatus to communicate to other nodes that said first node wishes only to receive updates that have or exceed a predetermined importance value.

81. (New) A computer readable medium as claimed in claim 76 wherein said instructions further cause the computing apparatus to communicate to other nodes that said first node wishes only to receive a predetermined number of updates with the highest importance values.

82. (New) A computer readable medium for storing a set of programming instructions for execution by, or on behalf of, a first node on a self-organizing network having a plurality of nodes and at least one link interconnecting each of said nodes, said instructions causing a computing apparatus to attach a specific node number identifying said first node to data packets being sent by said first node.

83. (New) A computer readable medium as claimed in claim 82 wherein said instructions further cause the computing apparatus to perform an O(1) lookup for packet routing when said first node receives a data packet having a specific node number identifying another node.

84. (New) A computer readable medium as claimed in claim 36, said instructions causing a computing apparatus to assign a value to said first node that can be taken into account during the selection of parent nodes in said network.

85. (New) A computer readable medium for storing a set of programming instructions for execution by, or on behalf of, a first node on a self-organizing network having a plurality

of nodes and at least one link interconnecting each of said nodes, said instructions causing a computing apparatus to forward messages from a source node to a destination node via neighbors depending on the latency to the destination node via said neighbors.

86.   (New) A computer readable medium as claimed in claim 85 wherein the latency of the internal message queue of messages for a destination node is used to decide which neighbor messages for said destination node should be sent to.

87.   (New) A computer readable medium as claimed in claim 86 wherein messages for a destination node are sent to a neighbor node if the latency to said destination node from said neighbor node is equal or less then the latency of the message queue for messages being sent to said destination node.

88.   (New) A computer readable medium as claimed in claim 85 wherein messages for a destination node are not sent to a neighbor node when the neighbor node is in a specified state regarding messages for said destination node.

89.   (New) A computer readable medium as claimed in claim 88 wherein messages for a destination node are not sent to a neighbor node when the neighbor node can not process an increased volume of messages for said destination node.

90.   (New) A computer readable medium for storing a set of programming instructions for execution on a first node, where said first node forms part of a self-organizing network having a plurality of other nodes executing similar sets of said programming instructions and at least one link interconnecting neighbouring ones of said nodes; said programming instructions causing said first node to:

    (a)   determine the identity of a parent node, wherein said parent node is a neighboring node to said first node that has one or more desired characteristics;

    (b)   deliver instructions to a neighboring node from said first node that will cause said neighboring node to deliver instructions to its determined parent node; and

    (c)   deliver instructions in response to said neighboring node that has delivered instruction to said node to deliver instructions to its determined parent node.

91.   (New) A computer readable medium as claimed in claim 90 wherein said one or more desired characteristics include the characteristic of how many nodes in said network have a preferred route through said neighbor node.

92.   (New) A computer readable medium as claimed in claim 91 wherein said programming instructions further cause said first node to determine a value attached to at least one of said other nodes to cause said first node to place more significance to the selection of said neighboring node as a best next step to reach said node.

93.   (New) A device utilizing the instructions stored by the computer readable medium as claimed in claim 36.

94.   (New) A device as claimed in claim 93 wherein said device comprises one of: a router, a cell phone, a pda, a utility meter, a vehicle, an aircraft, a sensor, a munition, a satellite, a computer or any other device capable of utilizing said instructions stored in said computer readable medium.

95.   (New) A self-organizing network comprising:

(a)   a plurality of interconnected nodes, wherein neighbouring nodes are interconnected by at least one link;

(b)   each of said nodes being operable to maintain information about at least one of said other nodes, said information including in respect to a representative first node:

(i)   a first identity identifying a second node that is a best neighbour to said first node according to one or more pre-determined factors;

(ii)   for each first identity, a second identity identifying a third node that is a next best neighbour to said first node according to one or more pre-determined factors.

96. (New) A computer implemented process for spreading network knowledge within a network having a plurality of nodes, each said node being linked to a neighbouring node by at least one link, said process comprising the steps of:

    (a)   each node determining the presence of at least one neighbouring node in said network;

    (b)   each said node exchanging information with neighbouring nodes in said network concerning the presence of said neighbouring nodes;

    (c)   each said node updating its information concerning neighbouring nodes in said network based on said information received from said neighbouring nodes; and

    (d)   repeating said steps at desired intervals.

97. (New) A computer implemented process for delivering payload data from an originating node to a destination node in a network having a plurality of nodes, each said node being linked to a neighbouring node by at least one link, and at least some of said nodes having information concerning certain service characteristics for said neighbouring nodes, said process comprising the steps of:

    (a)   identifying one or more desired service characteristics associated with payload data intended for delivery in said network; and

    (b)   selecting a preferred delivery path among said nodes in said network for said payload data based upon said desired service characteristics and said service characteristic information.

98. (New) A process as claimed in claim 97 wherein said service characteristics comprise at least one of bandwidth, cost, speed and bit error rate.

99. (New) A computer implemented process for spreading instructions that control the spread network knowledge within a network having a plurality of nodes, each said node being linked to a neighbouring node by at least one link, said process comprising the steps of:

(a) each node establishing a connection with one or more neighboring nodes;

(b) each node determining the identity of a parent node, wherein said parent node is a neighboring node to said first node that has one or more desired characteristics;

(c) each node that receives particular instructions from a neighboring node delivering instructions to its determined parent node;

(d) each node that receives particular instructions from a parent node in response to instructions it sent to said parent node sending instructions to said neighbor node that sent said node instructions that caused said node to send instructions to said parent node; and

(e) each node repeating said steps at desired intervals.

100. (New) A computer implemented process for increasing the frequency that a node sends updates about a destination node the closer said node is to a data path to said destination node, said process comprising the steps of:

(a) each node establishing a connection with one or more neighboring nodes;

(b) each first node determining a rank to all nodes based on its proximity to said node or a data path heading towards said node;

(c) each first node sending node updates to neighbor nodes more frequently based on rank of said nodes; and

(d) each node repeating said steps at desired intervals.

101. (New) A computer implemented process for removing information about a node after said node is removed from a network, said process comprising the steps of:

(a) each node delaying the sending of a node update to a neighbor if previous update about said node indicated that there was no route to said node through said sending node;

(b)   each node delaying the sending of a node update to a neighbor if no previous update about said node had been sent by said sending node to said neighbor node; and

(c)   each node repeating said steps at desired intervals.

102.   (New) A computer implemented process for removing information about a node after said node is removed from a network, said process comprising the steps of:

(a)   each node sending an update about some node in the network indicating that said sending node has no route to said node in the network if said sending node determines that the cumulative service characteristics to reach said network node have reached a specified state; and

(b)   each node repeating said step at desired intervals.

103.   (New) A computer implemented process for ranking importance of node updates based on the proximity to structures that affect said nodes, said process comprising the steps of:

(a)   each node establishing a connection with one or more neighboring nodes;

(b)   each node ranking all nodes that it has stored information on based on said nodes proximity to structures that affect said nodes;

(c)   each node sending updates about said nodes to said neighbor nodes on a relatively more frequent basis the higher the rank of said nodes; and

(d)   each node repeating said steps at desired intervals.

104.   (New) A computer implemented process for sending data to destination nodes via neighbor nodes based on the latency provided by said neighbor nodes to said destination nodes, said process comprising steps of:

(a)   each node establishing a connection with one or more neighboring nodes;

(b)   each node forwarding messages for a destination node to a neighbor node that provides a latency value that is less or equal to the latency of the queue of messages stored on said node for said destination node; and

(c)   each node repeating said steps at desired intervals.

105.   (New) A computer implemented process for quickly routing data from node to node by using locally assigned numbers that represent the names of nodes in the network, said process comprising steps of:

(a)   each node establishing a connection with one or more neighboring nodes;

(b)   each node using an internal number to represent the names of nodes that it stores information on;

(c)   each node determining which neighbor node to send data packet for said destination node by using its internal number to efficiently look up the preferred neighbor;

(d)   each node before sending a data packet for a destination node to a neighbor node sending a message to said neighbor node that allows said neighbor node to determine which internal number represents the name of said destination node;

(e)   each node sending a data packet for a destination node to a neighbor node with said nodes internal number representing the name of said destination node attached to said data packet;

(f)   each node upon receipt of said internal number performing a lookup to translate said neighbors internal number into said nodes internal number; and

(g)   each node repeating said steps at desired intervals.

106.   (New) A computer implemented process for limiting the number of different nodes that a neighbor node is sent updates for, said process comprising the steps of:

(a)   each node establishing a connection with one or more neighboring nodes;

(b)   each node ranking all nodes that it has stored information on based on said nodes proximity to structures that affect said nodes;

(c)   each node telling its neighbors the maximum number of nodes it wants to be sent updates for;

(d)   each neighbor node sending said node its highest ranked nodes up to the maximum count requested by said node; and

(e)   each node repeating said steps at desired intervals.